



MSIAC

Munitions Safety Information Analysis Center

Supporting Member Nations in the Enhancement of their Munitions Life Cycle Safety



Bulletin

IN THIS ISSUE



MSIAC 2018 Workshop	1
PM Perspective	2
MSIAC at PARARI	4
AUS country visit	5
Welcome Christelle Collet	6
30 th ISB	6
HeatFlow Calorimetry Symp. on EM	6
MSIAC Tools	7
US West Coast Country Visit	10
12 th Int'l Armement Conf.	10
B. Stokes Fellowship	10
AASTP-1 & 5	11
Welcome Dimitris Tsoukalos	11
Do not forget...	11
Movember	12



December 2017

CONTACT INFORMATION

☎ 32-2-707.54.16

☎ 32-2-707.53.63

🌐 <http://www.msiac.nato.int>
✉ info@msiac.nato.int

MSIAC 2018 WORKSHOP:



Improved Explosives and Munitions Risk Management

Granada, Spain | 10 - 14 September 2018

We can now report the date and location of the MSIAC Improved Explosives and Munitions Risk Management (IEMRM) workshop: 10-14 September 2018 at the Granada Conference Center in Spain. In Granada we will discuss a number of fundamental topics related to Hazard Classification (HC), Insensitive Munitions (IM) and explosives storage safety, with experts among the MSIAC member nations.



The workshop page has just been launched, and the call for abstracts has opened:

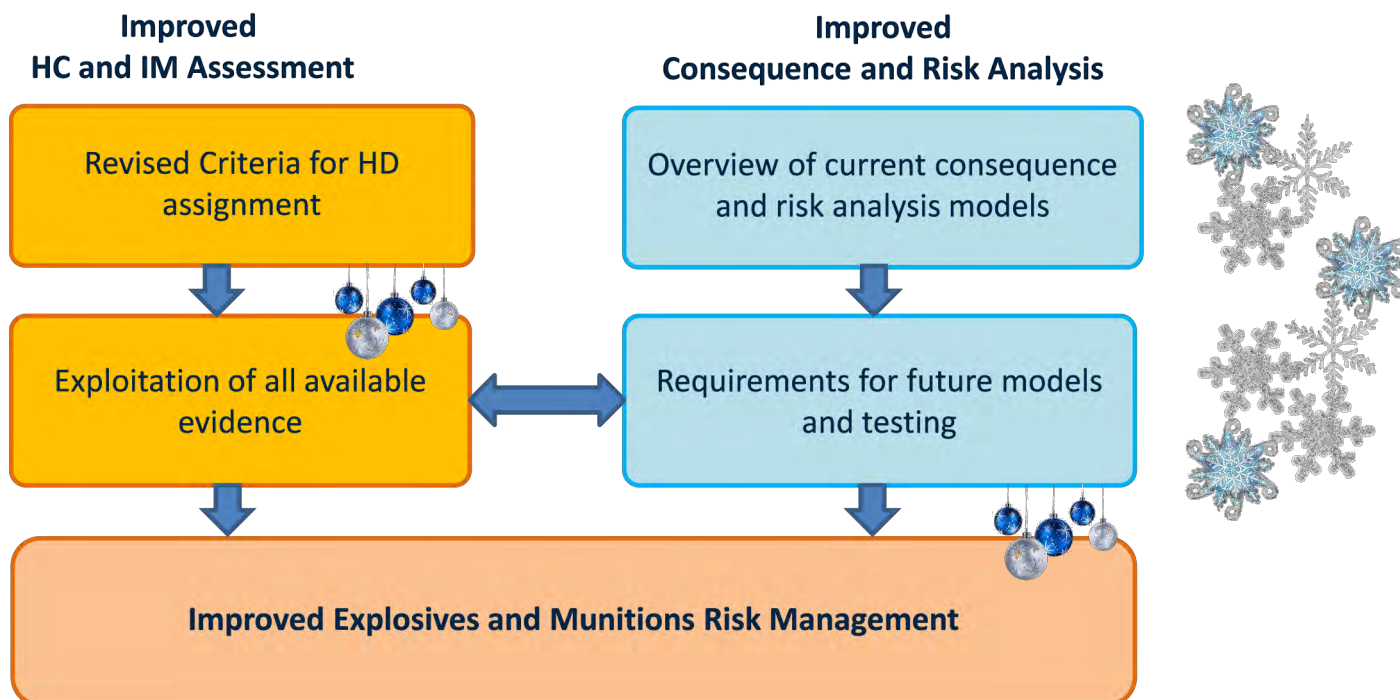
<https://www.msiac.nato.int/workshop/improved-explosives-and-munitions-risk-management>

The workshop will seek to achieve the following goals:

- ⊕ Develop improved methods for explosives and munitions risk management
 - ◇ Exploit results from small- and full-scale testing
 - ◇ Manage risk with sufficient detail and granularity
 - ◇ Enable benefits of IM to be realized
 - ◇ Enable more efficient management of munitions presenting greatest hazard
- ⊕ Support the IM and HC harmonization initiative
 - ◇ Identify how response descriptors can be introduced in HC testing
 - ◇ Identify whether there's a need for revised definition of Hazard Divisions (HD) and Storage (sub) Divisions (SsD)
- ⊕ Recommend implementation of improved methods in explosives and munitions safety risk standards
 - ◇ Ensuring they reflect the changing nature of the munitions stockpile
 - ◇ Balancing complexity versus ease of user application



A preliminary workshop structure is presented in the figure below. A more detailed breakdown and time schedule will be made available closer to the workshop. The workshop will contain various plenary and parallel sessions to optimize the exchange of information.



The topics shown in the figure are described in more detail in a [white paper](#) at the link. We are looking forward to your participation and a successful workshop!

Martijn van der Voort
MSIAC Safety of Storage and Transport Specialist



PM'S PERSPECTIVE

First, many thanks to those who have supported MSIAC's activities or used our products and services in 2017. Again, it's been a busy year which has resulted in a significant number of publications, and I would like to encourage you to look at the website for more details. A list of published papers, or soon to be released, is provided below and these can be downloaded from the secure website (you can [request a secure website password here](#)).

O-177	An International Review of the Slow Heating Test (Baker)
O-178	Review of Munitions Safety Processes within MSIAC Nations (Pope)
O-179	Future Developments of Quantity Distance Standards (van der Voort, Raimbault)
O-180	Probabilistic Aspects of the Initiation of Explosives and Ammunition (van der Voort, Sharp)
O-181	Gun Testing Ballistics Issues for IM Fragment Impact Testing (Schultz, Baker)
O-182	Ballistics Trajectory and Impact Analysis for Fragment Impact Testing IM and HC Project Criteria (Baker, van der Voort)
O-183	Laboratory Setback Activator Tests for Gun Launch Explosive Suitability (Baker, Sharp, Pope)



L-199	Mitigation Technologies for Rocket Motor (Maud Cheneau)
L-200	Benefits of IM (van der Voort, Ben Keefe)
L-203	Science of Cook Off Workshop – Final Report (Andrews, Sharp, Schultz, Babcock)
L-204	Science of Cook Off Workshop Ignition and Growth Focus Area (Shultz, Bryan Henson)
L-205	Science of Cook Off Workshop Material Damage Focus Area (Sharp, Malcolm Cook)
L-206	Science of Cook Off Workshop Violence of Reaction Focus Area (Babcock, Gert Scholtes)
L-207	Science of Cook Off Workshop Chemistry & Material Parameters Focus Area (Andrews, Lori Nock)
L-208	Science of Cook Off Workshop Chemistry & Materials Process Focus Area (Andrews, Kerry Clark)
L-209	Science of Cook Off Workshop Small Scaled Test Focus Area (Schultz, Laura Smilowitz)
L-210	Science of Cook Off Workshop Modelling Focus Area (Babcock, Didier Picart)
L-213	Material Parameters needed for Insensitive Munition-Related Modelling and Simulation Efforts (Babcock)
L-214	Modular Charge Systems (Schultz)
L-215	An International Review of Hazard Classification (Adrien Leroy, van der Voort, Pope)
L-216	An Overview of Shear Initiation and Ignition of High Explosives (Vincent Pouliquen, Baker)



These papers reflect some of the output from the MSIAC programme of work in 2017. Other items which are perhaps not so visible include continual update of the Database tools and the MSIAC document management system. We are working on a new tool, MSIAC QD (MQD), which compares analytical models with Quantity Distances tables. This has advanced well and a prototype is now undergoing testing. A detailed report on the tool will be issued as an MSIAC limited report after the MQD tool has been released (towards the end of 2018). We have also started working on the development of web application which will eventually replace TEMPER.

MSIAC staff continues to answer technical questions and most nations made good use of this service in 2017. A trend in recent years is that the complexity of questions has increased and a typical response might be a 10-15 page fully referenced report (we can even help provide references). Submitting a question is easy and requires approval from your national focal point officer (NFPO). This is achieved automatically by submitting the question using the website form [here](#).

We also continued our technical support for AC326 and its subgroups and working groups, with activities including:

SG/A(EMT)

- ⊕ Support to STANAG 4147 - Compatibility (Report due Spring 2018)
- ⊕ Setback Assessment of EM – MSIAC will contribute to US-led working group

SG/A(IST)

- ⊕ Demolition Materiel: Design, Testing and Assessments STANAG 2818 review

SG/B

- ⊕ Supporting the Fragment Impact CWG – Updated and presented MSIAC review paper O159 “Ed 2 An international review of the fragment impact test”
- ⊕ Supported Slow cook-off CWG in April 2017 – including preparation of survey and review
- ⊕ Work concluding on AOP-39 STANAG and SRD documents
- ⊕ Support to IM/HC Harmonisation
- ⊕ Support to NATO SDI Munitions Health Management Smart Defence Initiative in April 2017, Utrecht. Organizing and technically supporting workshops

SG/C

- ⊕ Supporting the working group on development of new QD table approach
- ⊕ Supporting the Airfield Criteria Working Group (new chapter with AF criteria)

2018 brings a number of new work streams and efforts. Of particular note is the workshop on Improved Explosives and Munitions Risk Management to be held in Granada, Spain, more information is available on the first pages of this edition of the newsletter.



MSIAC staff will also support the Insensitive Munitions and Energetic Materials Technology Symposium (IMEMTS) in Portland, Oregon, 23- 26 April 2018. We are proposing a number of specialist meetings in the margins of this dealing with the following: 23rd April – IM and HC harmonization working group, 27th April - setback and material suitability, and 27th April- Qualification of EM. We also have a number of new work elements in addition to our ongoing projects and usual activities. These include:

- ⊕ Ageing and Degradation of Pyrotechnic Compositions (Stokes Fellow). Rebecca Miller has joined the MSIAC team to work on improving understanding of ageing of flares. Ageing, life assessment and failure mechanisms are not well understood for pyrotechnic compositions. The aim of this project to gather information on types of flare compositions and carry out a life-cycle analysis to determine key/critical factors that will affect their life.
- ⊕ Emerging Technologies for Gun Propelling Charges. This programme of work will review research and development activities in the area of gun propelling charges.
- ⊕ Material Defects – Definitions, Tests and Principles. This work will begin MSIAC has been requested to provide assistance with defining defects for rocket motor, warhead, bomb and gun launch munitions. The work will review current pass/fail criteria development and methods/principles used to rate defects. The work will culminate with a workshop planned for 2020
- ⊕ Emerging Minimum Smoke Propellants. This effort will involve review of open research and development activities in the area of minimum smoke formulations for tactical rocket motors.
- ⊕ Database of Electromagnetic Radiation Hazards to Munitions. To assist the community, a common database will be developed to share information to calculate safe separation distances between transmitters and susceptible munitions in the maritime environment.

As always, I would like to encourage you to get involved in our programme of work during 2018. Please feel free to send us an e-mail requesting more information or to be kept informed or involved on any of our work elements. More information can also be found on the web site under the *Areas of Expertise* section <https://www.msiac.nato.int/areas-of-expertise>.

Finally I would just like to wish you Seasons Greetings and all the best for the New Year.

Dr Michael Sharp
MSIAC Project Manager



MSIAC AT PARARI



PARARI, the Australian Explosive Ordnance Safety Symposium, was held 21-23 November in the Australian Defence Force Academy in Canberra. The MSIAC attendees consisted of Michael Sharp, Martin Pope and Ernie Baker.

PARARI was structured to provide country overviews and a panel discussion on the first day, presentation of refereed papers on the second day and workshop tutorials on the third day. The Australian overviews introduced the new Australian EO safety programme being driven in by Director EO, Air Cdre Wade Evans RAAF and Capt Nigel Smith RAN. This was supported by a series of vignettes, delivered by actors, based on the crash of a UK RAF Nimrod aircraft in Afghanistan to highlight key aspects of approaches and culture towards safety and safety management. The presentations emphasized the movement from a more bureaucratic process and box ticking culture to safety assessments supported by subject matter experts.

MSIAC presented two refereed papers: Probabilistic Aspects of the Initiation of Explosives and Ammunition: M. van der Voort, M. Sharp; and Gun Launch Setback and Activator Tests, E. Baker, M. Sharp. MSIAC presented three tutorials: Experimental and Theoretical Basis of Current NATO Standards for Safe Storage of Ammunition and Explosives, M. van der Voort; MSIAC Safety & Suitability for Service Tutorial, M. Pope; and MSIAC Insensitive Munitions Design Tutorial, Ernest Baker. The presentations were well received with several questions related to accessing MSIAC personnel, tools and information.

The MSIAC stand was well visited, probably due to the free Belgian chocolates but this led to some lively and interesting discussions. Winner of the MSIAC business card raffle was Stephen Gillstrom-McLean (UK) who received a number of Belgium delicacies.



Dr Ernie Baker
MSIAC Warhead
Technology Specialist



AUSTRALIA COUNTRY VISIT

MSIAC conducted a country visit to Australia on 12-25 November 2017. The MSIAC delegation, consisting of Michael Sharp, Martin Pope and Ernie Baker. The visit included Thales (Mulwala), Chemring (Lara), DOS Group (Canberra) and DST Group (Edinburgh). The country visit provided the opportunity to introduce MSIAC services and products to the Australian MOD and industry, as well as for MSIAC personnel to be better acquainted with the Australian DOD requirements, processes, and current work and an update on the Australian energetics defence industries.

MULWALA. The MSIAC delegation, along with the Australian National Focal Point Officer, Sqn Ldr Timothy White (DOS), was hosted by Ian Powell for a tour and meeting at Thales in Mulwala on 15 November. The original Mulwala propellant production facility was built in 1944. However, in 2014, Australian Defence entered into a five-year interim contract that included development of a new propellant facility that is nearly completed. The old propellant manufacturing facility is nearly closed, with all operations due to stop by end 2017. The decontamination and demilitarization of the old facility remains to be done. The Mulwala site is a government owned/contractor operated (GOCO) facility that comprises some 400 personnel, 300 buildings on a 1300 hectare site. Of particular note from the new propellant production facility tour were the cellulose cutting procedure, the propellant grain extrusion face cutting and the propellant water transport system. An improved paper slicing process has been implemented with the result that the nitration and NC quality is more controllable and consistent. A face extrusion cutter process has been implemented where grains of propellant are cut immediately upon extrusion. The water transport system allows large amounts of propellant to be efficiently transported to a drying and packing facility. MSIAC provided presentations on the MSIAC organization and ongoing activities, MSIAC Tools, Energetics Research Review, Gun Propulsion Technology Development Review, and RAM Survey Results. The MSIAC presentations were well received with the highest interest appearing to be associated with the gun propellant brief.



LARA. The group were hosted by Kirk Berenger at Chemring in Lara on 16-17 November. The Chemring production facilities is on a site that has been making pyrotechnics since 1892. However, there is a new pyrotechnic production facility which has recently been completed with design and construction beginning in 2008. This production facility consists of an automated and integrated pyrotechnic production line (bottom left of photograph) in a single building with a minimum number of staff undertaking just minor tasks and packing. The tour included the control room for the automated facility

where we were given an excellent overview of the facility, processes and management. It was refreshing to see pyrotechnic manufacture moving into a new era with safer management and control of processes and less exposure of staff to hazards.

MSIAC provided presentations on the MSIAC organization and ongoing activities, MSIAC Tools, SASO-MSAS, S3 Study, Slow Cook-off Survey and Historical Events Review and Resonant Acoustic Mixing (RAM) Survey. The MSIAC presentations were well received with the highest interest appearing to be associated with the resonant acoustic mixing (RAM) brief.



CANBERRA. On 18 November Sqr Ldr T. White hosted the MSIAC delegation for a visit to DOS. Capt. Nigel Smith RAN, led a discussion on changes to policy and the implementation of new munitions safety processes. An emphasis has been placed on moving from a more bureaucratic process and box ticking culture to safety assessments supported by subject matter experts. DOS had a number of impressive posters on display that presented different explosive ordnance incidents that highlighted the importance of munitions safety.



Australian Government

Department of Defence

Defence Science and
Technology Group

EDINBURGH. On 24 November the MSIAC delegation were hosted by Ian Lochert to visit the Energetic Materials team at DST Group located in Edinburgh near Adelaide. The delegation met with a group of DST Group SMEs, provided several MSIAC topical briefs and then toured some of

the DST Group facilities. MSIAC provided presentations on MSIAC organization and ongoing activities, SASO-MSAS, S3 Survey Results, Energetics Research Review, Slow Cook-off Survey and Historical Events Review and Resonant Acoustic Mixing (RAM) Survey. The MSIAC presentations were again well received with the highest interest appearing to be associated with the energetics briefs. The facilities tour included viewing the DST Group RAM, energetics additive manufacturing and water detonation chamber. DST Group has a LabRAM II H, which is the LabRam developed for the processing of energetic materials. The additive manufacturing capability development is currently concentrating on gun propellant development. The RAM had been used to assist in rapid development of a new plastic explosive for Australia that might have otherwise taken some time to formulate and mix by more traditional means. The usual problems of incorporating the taggant were easily resolved using the RAM with nil or minimal loss of material.

Dr Ernie Baker
MSIAC Warhead Technology Specialist





WELCOME TO ... CHRISTELLE COLLET

Christelle joined MSIAC on 2 October 2017 as the Technical Specialist Officer for Propulsion Technology.

Like her predecessor in this position, Emmanuel Schultz, Christelle holds an Engineering degree in aeronautics, mechanics and energetics from ENSMA (Ecole Nationale Supérieure de Mécanique et d'Aérotechnique), Poitiers, France.

From 2003 to 2017, she worked as a research scientist in Le Bouchet Research Center, the ArianeGroup's Research Center on energetic materials for space and defense applications.

After being progressively in charge of or involved in all the experimental studies related to explosives and detonics in the Research Center, she became Project Manager of detonics studies (formulation, numerical and experimental works) in 2005. She was also in charge of numerous experimental studies related to the vulnerability of warheads and rocket motors, from lab scale to large scale.

Between 2011 and 2015, she was the Head of the Detonics & Safety Laboratory and was nominated Expert in detonation phenomena in 2013.

In 2015, she was assigned the role of Project Manager in propulsion studies, dealing with research on solid rocket motors and new generations of solid propellants.

At MSIAC, in addition to supporting the whole MSIAC team, she is more specifically in charge of AIMS and MTM databases. She is the point of contact for all propulsion technology related questions.

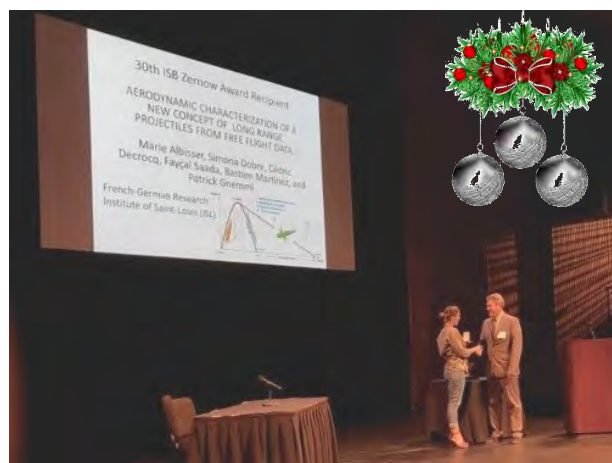
The MSIAC team wishes her good luck in her new position.



MSIAC PARTICIPATION IN THE 30TH INTERNATIONAL SYMPOSIUM ON BALLISTICS

MSIAC participated in the 30th International Symposium on Ballistics (ISB) which took place on 11-15th September in Long Beach, California, USA. Two MSIAC papers were presented: "Laboratory Setback Activator Tests for Gun Launch Explosive Suitability" by Ernie Baker (Warheads Technology TSO) and "Projection Criteria for Insensitive Munitions and Hazard Classification" by Martijn van der Voort (Munitions Safety, Transport & Storage TSO).

Dr. Baker headed the selection committee for the Louis and Edith Zernow Award in Ballistics, which is presented to the author(s) of the paper containing the best advancement made in the fundamental nature of ballistics. The award-winning paper, entitled "Aerodynamic Characterization of a New Concept of Long Range Projectiles from Free Flight Data", was authored by Marie Albisser, Simona Dobre, Cédric Decrocq, Fayçal Saada, Bastien Martinez and Patrick Gnemmi from the Institute Saint-Louis.



Marie Albisser (ISL) is presented the ISB Zernow Best Paper by Dr Ernie Baker (MSIAC Warheads Technology TSO)

Dr Ernie Baker
MSIAC Warhead Technology Specialist

HEAT FLOW CALORIMETRY SYMPOSIUM ON EM

The 10th Heat Flow Calorimetry Symposium was chaired by Dr. Sara K. Pliskin and Mr. Ryan Ubelhor of Naval Surface Warfare Center, Crane. This meeting is for thermal analysis professionals from the military, government, industry and academic fields, to discuss issues related to the testing of energetic materials. Specific emphasis is on isothermal calorimetry of pyrotechnic, explosive and propellant materials but other forms of thermal analysis, materials, and equipment advances are discussed as well. Heat flow calorimetry has proven to be very important in assessing the thermal behavior and lifetime of energetic materials. It is used to evaluate safety, decomposition kinetics, shelf-life prediction and compatibilities of reactive materials. This meeting was attended by 48 registered attendees and lasted 3 full days. NSWC Crane hosted 20 foreign nationals in addition to 28 domestic visitors. This symposium included 18 technical presentations as well as a special Safety Panel discussion. Technical presentations comprised of compatibility of energetic materials, software predictive modeling, ageing of energetic, characterization of RDX (round robin between 9 European Test facilities) and papers on the stability and surveillance of gun propellant. The introduction of new instrumentation by vendors was also given by Netzch, TA Instruments Thermal Hazard Technology, and Setaram. A tour of Crane facilities, the Rapid Innovation Prototype Laboratory and Environmental Test Facility, was also given on the last day. The next HFCS-EM is tentatively scheduled for 2019 and the location is to be determined.





MSIAC TOOLS DESIGNED TO HELP YOU!

INTRODUCTION

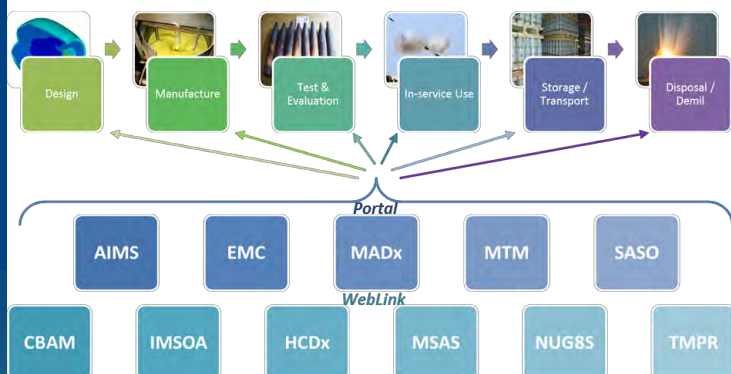
As an Information and Analysis Center, MSIAC continually pursues approaches to improve our members' access to the large volumes of information held within our repositories. In some cases direct access to reports, papers and journals is granted but finding specific information can sometimes be seen as looking for that needle in the proverbial haystack.

MSIAC staff has used their knowledge to support you by generating a number of tools for: analyses of specific threats, benefit models, and databases to find information quickly and efficiently.

WHAT ARE THE TOOLS?

These tools, listed in the graphic below, are fully searchable databases or analytical tools that cover the spectrum of munitions safety and insensitive munitions.

They have been designed to aid anyone working across the field of munitions, from warhead designers to formulators, and from desk officers involved in procurement, safety assessment to those associated with storage & transport. Each tool is placed within the program of work to ensure they are maintained and regularly updated. It also allows, when gaps are identified, for new tools to be developed.



WHO CAN HAVE ACCESS TO THESE TOOLS?

Firstly, you must be from a MSIAC member country, which now includes Poland and the Republic of Korea.

Access can be granted to those people with a need to know in government, industry and academia. The selection process is controlled by personnel based within each country's government.

HOW CAN I GAIN ACCESS TO THESE TOOLS?

You must complete a simple application form that can be found on the MSIAC website.

<https://www.msiac.nato.int/contact-access/access-request-form-for-members-of-msiac-nations>

The form will be sent to both MSIAC and your country's National Focal Point Officer, or to the Service Representative (USA only). Once they have confirmed your eligibility you will receive log on credentials. Some tools are restricted to specific, contributing nations and for government only.

This process is fast and you could be accessing these tools within days of request.

WHERE CAN I FIND THESE TOOLS?

The tools are located in a secure part of our system that can be accessed via the MSIAC website. On the main menu, under 'Secure Website', you will find two distinct areas: the Portal, and WebLink.



The Portal contains the web based tools, which can be run from any internet enabled device including mobile phones and tablet. To run these tools one only requires local permission to access the internet.

WebLink is a data repository that provides you access to a large number of publications: Open and Limited MSIAC reports, Standards and proceedings from several munitions-related conferences. This is also the location to download our tools that run from your desk top. Some tools will require local permissions to install whilst others rely on Microsoft Office products.

CAN I FIND OUT MORE ABOUT THE TOOLS?

MSIAC has generated an easy reference booklet that contains an overview of each tool. A dedicate fiche explains what the tool does, where to find it, any associated publications, who can have access and the Technical Specialist Officer (TSO) responsible for its maintenance and updates.

This booklet is now available electronically [here](#) and in paperback from any of the TSO's. Information on the tools can also be found on the website under 'Products & Services/Tools'.



RECENT TOOLS NEWS & UPDATES

ADVANCE INSENSITIVE MUNITIONS SEARCH (AIMS)

TSO> Christelle Collet

AIMS provides access to **IM test results** for munitions and generic test units for each threat defined by the NATO IM policy. The information is displayed in a table that provides all information about the tested items, potential mitigation techniques used, test set-up and test results.

The platform also enables users to search **through all the databases at once** by using a unique and simple interface. Tests performed with the standardized IM threats can also be sorted in a synthesized table that easily allows comparison of the **munitions IM signatures**.

In addition to the constant update with new elements, it will be possible in the near future to easily switch from AIMS to EMC and reversely by the addition of **cross-links in energetic fillings**.

Component Comparison

Component	1000	1000	1000
Chemical	1000	1000	1000
Physical	1000	1000	1000
Chemical Properties	1000	1000	1000
Physical Properties	1000	1000	1000



MITIGATION TECHNIQUES FOR MUNITIONS (MTM)

TSO> Christelle Collet

MTM provides access to **technologies to mitigate the reaction of munitions against IM threats** as defined by the NATO IM policy. Munitions manufacturers may use it to **design less sensitive munitions and containers** (e.g. venting, thermal protection). The military will find **storage solutions** specifically to avoid sympathetic reaction (e.g. barrier, storage arrangement).

A **powerful search engine** provides a short description of the technologies and its related attributes, including reference(s) (featuring a link to the document(s) in WebLink) and picture(s) when available.

The application offers the possibility to select a list of mitigations of interest and then **print or create a PDF document**.

A major update has seen the addition of 34 new examples of mitigation techniques, as well as 49 references.

Examples (107)

ID	Description	Threat	Component	Category	Technique	Configuration	Permanent modification	Ref.
1	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
2	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
3	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
4	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
5	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
6	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
7	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000
8	Advanced coating for the 1000 and 1000	1000	1000	1000	1000	1000	1000	1000



Example 57

A 4.5 inch Anti-Friction assembly has been developed for the 4.5 inch 1000 cartridges. This simple and effective mitigation system made out of round mild or stainless steel has been validated to prevent propagation of IM between rounds, limiting the consequences to one round only. The bar, symmetrically positioned between 2 grains, intercepts and deflects fragments emanating from the grain preventing them from impacting the adjacent shell case. The shape of the bar also changes the momentum induced from the readings by altering internal vectors to cancel each other out, reducing momentum, theoretically, by some 30%.

Technical Category: Configuration Reference

Threat: 1000

Component: 1000

Category: 1000

Technique: 1000

Configuration: 1000

Reference: 1000

Permanent modification: 1000

Ref: 1000

ENERGETIC MATERIALS COMPENDIUM (EMC)

TSO> Dr Matthew Andrews

Information on formulations and components are continually added to EMC. Information can be found within the 'News' section of the tool.

New functions for this version (EMC 5.2) now allow for faster searching and comparison of results. The **adaptive table** within the formulations database allows for fast viewing of a 'performance' or 'sensitivity' result.

Up to four components or formulations can now be compared in the side-by-side view using the **compare** function.

Export functions to Excel and pdf will be implemented to comparison views for users to add to reports.

Formulation Search

Use this page to search for a formulation by name. Browse the table to perform an advanced search by selecting your search criteria.

Search criteria:

Name: [text input]

Locality: [text input]

Classification: [text input]

Advanced search: [text input]

Search: [button]

Formulations (5)

ID	Name	Locality	Classification	Component
1000	1000	1000	1000	1000
1000	1000	1000	1000	1000
1000	1000	1000	1000	1000
1000	1000	1000	1000	1000
1000	1000	1000	1000	1000



MSIAC ACCIDENT DATABASE EXCHANGE (MADx)

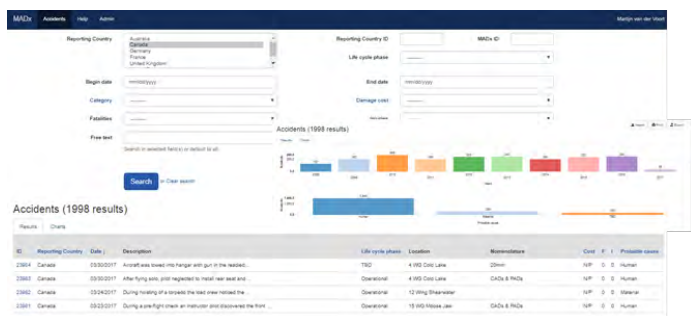
TSO> Martijn van der Voort

The MSIAC Accident Database (MADx) allows easy searching in over 12,400 accident reports from US, UK, France, Australia, Canada and Germany. After a year of development and testing, MADx has recently been released to all governmental users from those nations.

The database contains information about the date, location, weapon type, life cycle phase, cause, and the number of injuries and fatalities.

We invite other nations to contribute to MADx and gain access to the database.





SAFETY ASSESSMENT SOFTWARE (SASO)

TSO> Martin Pope

Plans are underway to update the infrastructure behind SASO to provide a similar look as the other web-based products.

NIMIC EXCEL WORKSHEETS ON GAP TESTS (NEWGATES)

TSO> Dr Ernie Baker

The latest version of the Excel worksheets on GAP TESTS, NEWGATES version 1.11 is completed, uploaded onto the MSIAC secure website and is ready for use. NEWGATES contains information related to gap tests. The database has been developed in Excel2003 and runs on a personal computer in the Microsoft Windows environment. It provides the IM community with 6 databases:

- information about 10 gap tests (dimensions, scope, principles);
- pressure calibration curves;
- time calibration curves;
- shock curvature calibration curves;
- 1568 gap test results;
- +250 Hugoniot.

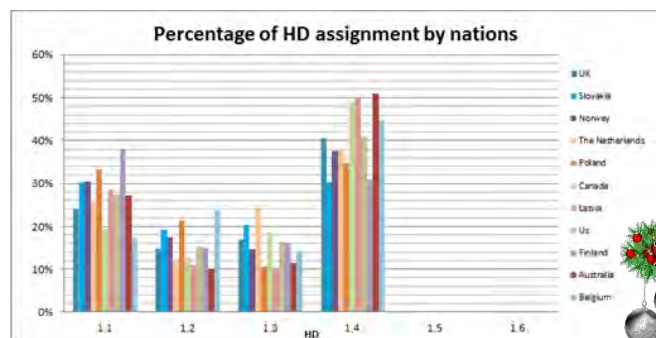
An analytical module is also included to estimate the Hugoniot of a mixture from its composition and the Hugoniot of its ingredients. The unreacted Hugoniot can be used to calculate the threshold initiation pressure seen in the acceptor.

Finally, version 1.11 includes the capability to calculate unreacted Hugoniot at different percentages of theoretical maximum densities and a new correlation module between NOL-SSGT, NOL-LSGT and critical diameter of energetics. This new module can be used to estimate critical diameters.

HAZARD CLASSIFICATION DATABASE EXCHANGE (HCDX)

TSO> Martijn van der Voort

Fourteen countries share their Hazard Classification assessments through the MSIAC Hazard Classification Database Exchange. HCDx contains information on the articles Hazard Division (HD), Compatibility Group, Sensitivity Group, NEQ, NSN number and packaging



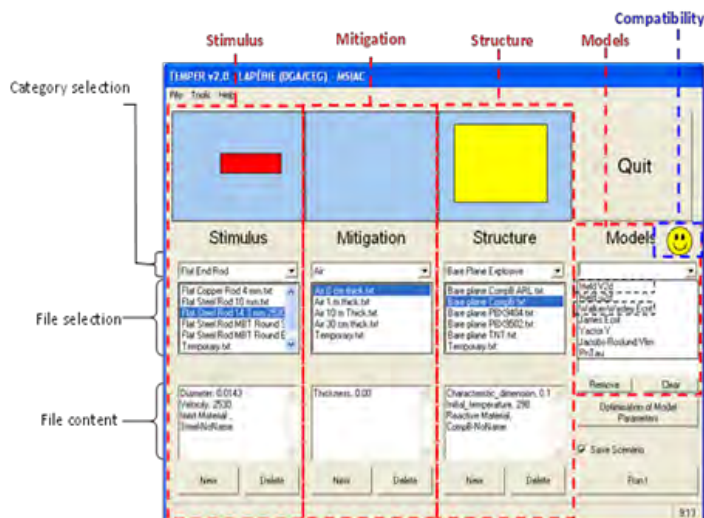
information. The data was analysed and compared in a recent trainee program.

TOOLBOX OF ENGINEERING MODELS FOR THE PREDICTION OF EXPLOSIVE REACTIONS (TEMPER)

TSO> Dr Ernie Baker

The latest version of Toolbox of Engineering Models to Predict Explosive Reactions, TEMPER v2.3 has been successfully compiled and uploaded onto the MSIAC secure website and is ready for use. It is essentially identical to TEMPER v2.2.1, except that it will now run on recent versions of Windows and is compatible with recent versions of Excel. TEMPER is a library of models developed by the Gramat Research Centre (Centre d'études de Gramat, or CEG) and the NATO Munitions Safety Information Analysis Centre (MSIAC). TEMPER is available (executable and source code). MSIAC is responsible for making TEMPER available via its secure website, some product support and development, and user group management.

TEMPER is a unique and powerful software package that utilizes a library of empirical or semi-empirical models dedicated to insensitive munitions (IM) assessment. It is an "open source", Object-Oriented Programming project programmed in Microsoft Visual Basic 6.0 (VB6). Unfortunately, the final release of VB6 was in 1998. On April 8, 2008 Microsoft stopped supporting VB6. As a result, a new application is currently being developed to phase out TEMPER. The new application, named ARM: Analytical Response Models will be web based, but maintain stand-alone capability as well. The initial very basic release of ARM is expected early in 2018. ARM is planned for significant development during 2018 and 2019.



US WEST COAST COUNTRY VISIT

MSIAC conducted a USA west coast country visit on 7-11 September 2017. The visit included Los Alamos National Laboratories (LANL), Sandia National Laboratories (SNL) and the Naval Air Warfare Center, China Lake (NAWC-CL). The MSIAC delegation consisted of Michael Sharp, Wade Babcock and Ernie Baker. An MSIAC East Coast USA country visit is planned for 2018.



On 7 September, Dr. Tom Mason hosted the delegation for a visit to LANL. On 8 September, Dr. Leanna Minier hosted the delegation for a visit to SNL. There were 12 personnel at LANL and 10 personnel at SNL that attended the various MSIAC briefings. The attending personnel represented the key areas of the laboratories that would have interest in MSIAC's products, services, and programs. Both LANL and SNL provided overview presentations.

MSIAC provided informational briefings including an overview of MSIAC activities, IM Design and MSIAC tools, Programme of Workshops and Technical Meetings including the upcoming "Improved Explosives and Munitions Risk Management" workshop, recent developments in Energetic Materials Research, and Probabilistic Initiation. Dr. Michael Hobbs (SNL), a participant in MSIAC's Science of Cook Off workshop, was a fervent endorser of MSIAC's capabilities, and presented an update on some of his work during our visit. Lively conversation included several questions related to tools access, collaboration opportunities and the application process for Stokes Fellow positions with MSIAC to encourage professional growth.

On 10 September, Dr. Ephraim Washburn hosted the delegation for a visit to NAWC-CL. 17 US Navy personnel attended the various MSIAC briefings, including representation from the Naval Surface Warfare Center, Indian Head (NSWC-IH). The attendees represented the key areas at NAWC-CL and NSWC-IH that have interest in MSIAC's products, services, and programs. MSIAC provided informational briefings including an overview of MSIAC activities, IM Design and MSIAC tools, Programme of Workshops and Technical Meetings including the upcoming "Improved Explosives and Munitions Risk Management", Integrated Health Management, Slow Heating Testing Survey and Historical Review of Fire Event Heating Rates and Durations, and IM State of the Art. One topic of specific interest during the visit was the possibility of posting recent hires for MSIAC internships or Stokes Fellow positions at MSIAC.

Dr Ernie Baker

MSIAC Warhead Technology Specialist



12TH INTERNATIONAL ARMAMENT CONFERENCE

The 12th International Armament Conference on "Scientific Aspects of Armament & Safety Technology" will be held from September 17th to 20th 2018 at the Hotel WINDSOR in Jachranka, Poland. The conference is organized by Institute of Armament Technology in Military University of Technology (Warsaw, Poland) and Military Institute of Armament Technology (Zielonka, Poland).

This conference brings together scientists of different research fields sharing and discussing current research and advances in armament and safety technology. The meeting format has been established to support individual presentation of papers by military, government, industry executive and technical personnel. A call for papers and more information can be found at <http://www.wml.wat.edu.pl/index.php/home-mku.html>.



INTRODUCTION

The fellowship program's aim is to provide opportunities for junior to mid-level Insensitive Munitions (IM) or Munitions Safety (MS) engineers or scientists to participate in MSIAC activities and gain first-hand information, training and technical experience.

Benjamin B Stokes, III, was a propulsion design TSO at NIMIC from 1992 until his untimely death in 1997. He was an internationally known US member of the munitions community and the fellowship program was founded in his name to further his efforts in achieving munitions safety through IM initiatives.

BACKGROUND

In mid-November, Rebecca Millar started at MSIAC as a Stokes Fellow, located at NATO HQ in Brussels. With supervision from Dr. Matthew Andrews and Wade Babcock, she will be working on a project investigating the ageing, degradation and life assessment of flares.



Rebecca read a Mechanical Engineering degree at the University of Aberdeen before spending five years in the oil and gas industry. From there she moved to Babcock International Ltd. working on the UK Successor project, before joining the UK MoD Defence Ordnance Safety Group (DOSG) in August 2016. During her time at DOSG she has been working in the field of pyrotechnics, with a particular focus on aircraft countermeasures. She has recently started a part-time Masters degree in Explosive Ordnance Engineering at the Defence Academy, Shrivenham. Upon completion, July 2018, of her fellowship at MSIAC, Rebecca will return to DOSG.

AGEING AND DEGRADATION OF FLARE COMPOSITIONS

The life cycle of flare compositions will vary depending upon the platform and country of use. Ageing and degradation of traditional Magnesium, Teflon, Viton (MTV) flares are relatively well understood, however life assessment and testing is not consistent across NATO countries. Recent developments in spectral flares means the formulations are moving away from pure pyrotechnics. IM response, ageing characteristics and failure mechanisms are less well documented for these types of flares. Using research and engagement with manufactures and specialists from across the MSIAC nations, the aim of this fellowship project is to generate a deeper understanding of the flare lifecycle. In particular, the project will enhance knowledge of ageing and degradation processes (and their impacts) and identify documentation requirements for standardisation of flares. If anyone has information that may be pertinent to the above study, please contact: r.millar@msiac.nato.int.



AASTP-1 AND AASTP-5 LECTURE SERIES

The fifth and last lecture series of 2017 was held in Kineton (UK) from 2 to 6 October. There was a good representation from the UK including DOSG, DOSR, Army, and Navy. Among them were Matt Wingrave (DOSR) who is also the custodian for the NATO manual for safe ammunition storage (AASTP-1) within the NATO committee AC/326 SGC, and the Australian MSIAC Steering Committee member Lt. Col Arthur Tsamis. Additional participants came from the UK HSE and DSTL. There were also five students from other MSIAC nations including Sweden (2), US (2), and one from Canada.



Kineton ammunition depot & AASTP-1 and 5 group picture

Instructors Johnny de Roos and Tom Taylor made sure that the students worked hard, but nevertheless there was also some time for an excursion to the Kineton ammunition depot. Comparison between the UK Standard (JSP 482) and NATO Standards AASTP-1 and 5 were discussed and will remain of high importance.

We would like to thank NFPO Chris Wong for organizing this event, and Maj Becky Darke, SSgt Jason Burgess, and WO2 Roger Presho for the groundwork on site.

In the mean time, the AASTP-1 and 5 lecture series program for 2018 has been established. Due to the large interest the number of lectures has been increased to six.

The dates and locations are:

- ✦ *Germany-Berlin 19-23 February (confirmed)*
- ✦ *France-Versailles 19-23 March (confirmed)*
- ✦ *Spain-Madrid 16-20 April (tentative)*
- ✦ *Belgium-Brussels 28 May -1 June (confirmed)*
- ✦ *Finland-Helsinki 20-24 August (confirmed)*
- ✦ *Canada-Ottawa 22-26 October (confirmed)*

These lecture series will be provided by instructors Johnny de Roos and Eric Deschambault. Spaces are freely available to government and industry persons from all MSIAC nations, travel and subsistence is a personal responsibility. Courses are delivered in English. Currently these events are fully occupied, but

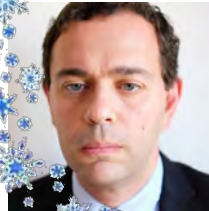
nevertheless you can make a request for participation in case there are cancellations.

Martijn van der Voort
MSIAC Safety of Storage and Transport Specialist
&
Martin Pope
MSIAC Munition Systems Specialist



ALSO WELCOME TO

... DIMITRIS TSOUKALOS



Dimitris joined MSIAC on the 27th of November 2017 as the IT Administrator.

He holds a BSc in Physics and an MSc in IT and Telecommunications from the National and Kapodistrian University of Athens, Greece.

He started his career in 2001 as a Software Engineer for Telecommunication equipment in Siemens. He then became a Telecom & Network Engineer for a couple of years before joining the Greek Telecom Organization (OTE). He stayed in this job for 7 years dealing with software projects (analysis, design, implementation, acceptance tests, upgrades).

In 2014 he moved to Belgium and started working for Alpha Networks as a Technical Product Manager and System Integration Engineer.

We also wish Dimitris good luck in his new job!



NOT TO FORGET...

**2018
INTERNATIONAL
EXPLOSIVES
SAFETY
SYMPOSIUM &
EXPOSITION**

**06 — 10 AUGUST 2018,
SAN DIEGO, CA, USA**

More information can be found via the website:
NDIA.org/intl-explosives-safety!

NDIA

**2018 INTERNATIONAL
EXPLOSIVES SAFETY
SYMPOSIUM & EXPOSITION**

SAVE THE DATE



August 6-10, 2018
Sheraton San Diego Hotel and Marina
San Diego, CA
NDIA.org/intl-explosives-safety





MOUSTACHIOED MSIAC MUSTER MONIES FOR MOVEMBER



The month of November saw the MSIAC staff turn their attention to raising awareness of men's health issues. For the gentlemen this included the abandonment of their razors and beard trimmers and the ladies joined in the fun by creating their own moustaches in order to raise money.

November is a busy time of the year for MSIAC made even more so as every two years this period coincides with PARARI and the Australian Country Visit. So the team started the moustache/beard growth spread around the globe. To some this was an advantage as their significant other halves were spared the initial growth, itchy phase and, looking like you've been in the outback for a week!

As the month grew on so the moustaches and beards flourished. The team was re-united in late November back at MSIAC HQ to compare styles and 'length'. The range, as shown by the pictures, included some fine looking beards, police inspector moustaches and, those of us with light hair, a Chuck Norris/Hulk Hogan (but you'll have to zoom in or visit the Movember page for a better look).

Importantly we did raise money and hopefully some discussion on men's health.

This year we raised a massive total of **€951** with kind donations coming from colleagues, ex-colleagues, family and friends. This more than doubled the kind contributions from 2016. This effort put the team in 13th place within Belgium. So a big THANK YOU to you all.

Should you wish to view the team page please follow this link: <http://moteam.co/my-stache-is-against-cancer>

As fun as growing moustaches can be, the importance of Movember is to improve communication of life-changing and life-threatening illnesses. The projects that were supported in Belgium include research into Testicular (EORTC TIGER Trial) and Prostate (Biomarker Initiative) cancer. The wider project also focuses on men's health, wellbeing, mental health and suicide prevention. You can find out more information at the following site (<http://be.movember.com/report-cards/>) including how much money was raised in your country and the types of projects being supported.



Dr Matthew Andrews
MSIAC Energetic Materials Specialist



Happy Holidays

